C. difficile

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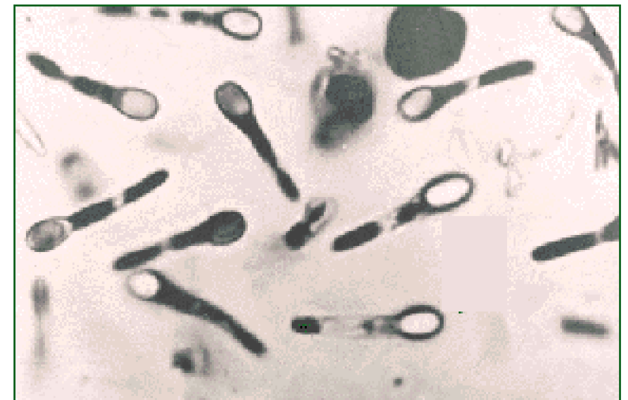
C. difficile

- Bacteria from the same family as tetanus, gas gangrene, botulism
- Produces spores when stressed—can live in the environment for many months
- "*difficile*" because it is difficult to grow
- Produces toxins A and B



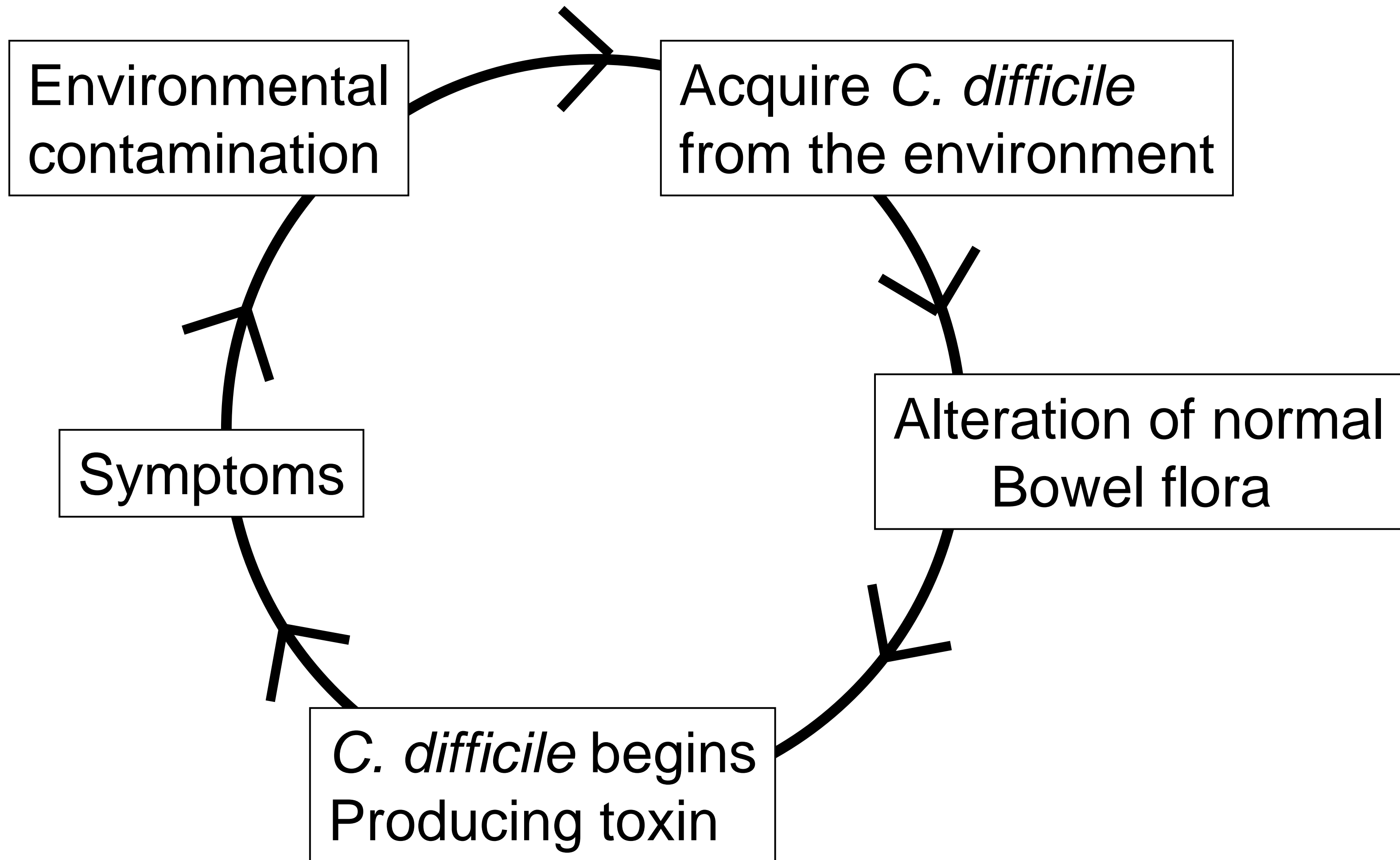
C. difficile associated disease (CDAD)

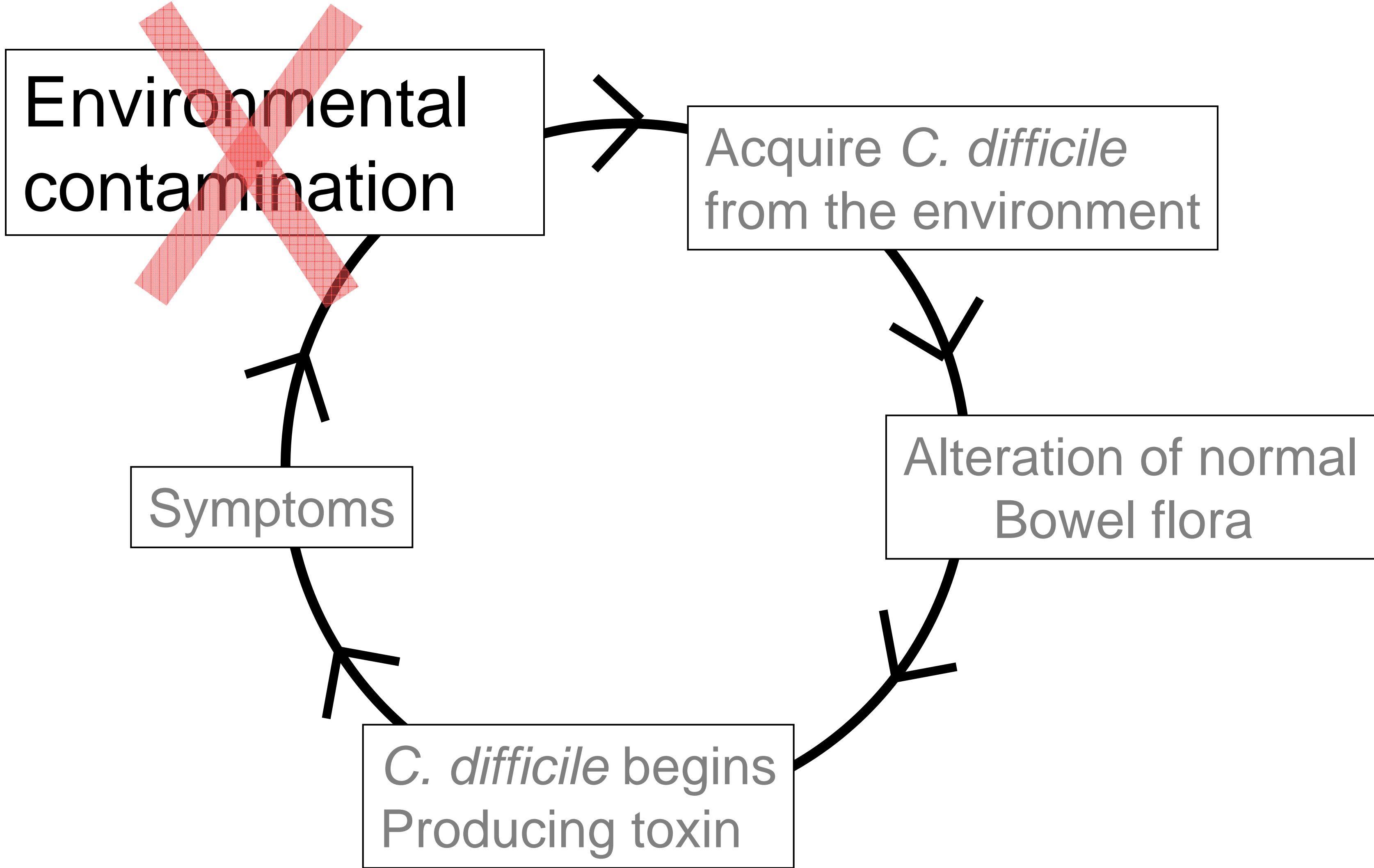
- Typically occurs in inpatients
- Outpatient disease considered rare but:
  - No Ontario data
  - Studies from the US, UK suggest it is far more common than first thought
    - 20-fold increase in one decade
- Tends to be more common in winter
  - More antibiotic use?

C. difficile associated disease (CDAD)

- Wide range of symptoms
  - None (carrier)
  - Diarrhea, abdominal cramps
  - Severe diarrhea, dehydration (pseudomembranous colitis)
  - Distended colon, intestinal perforation
  - Septic shock
  - Death

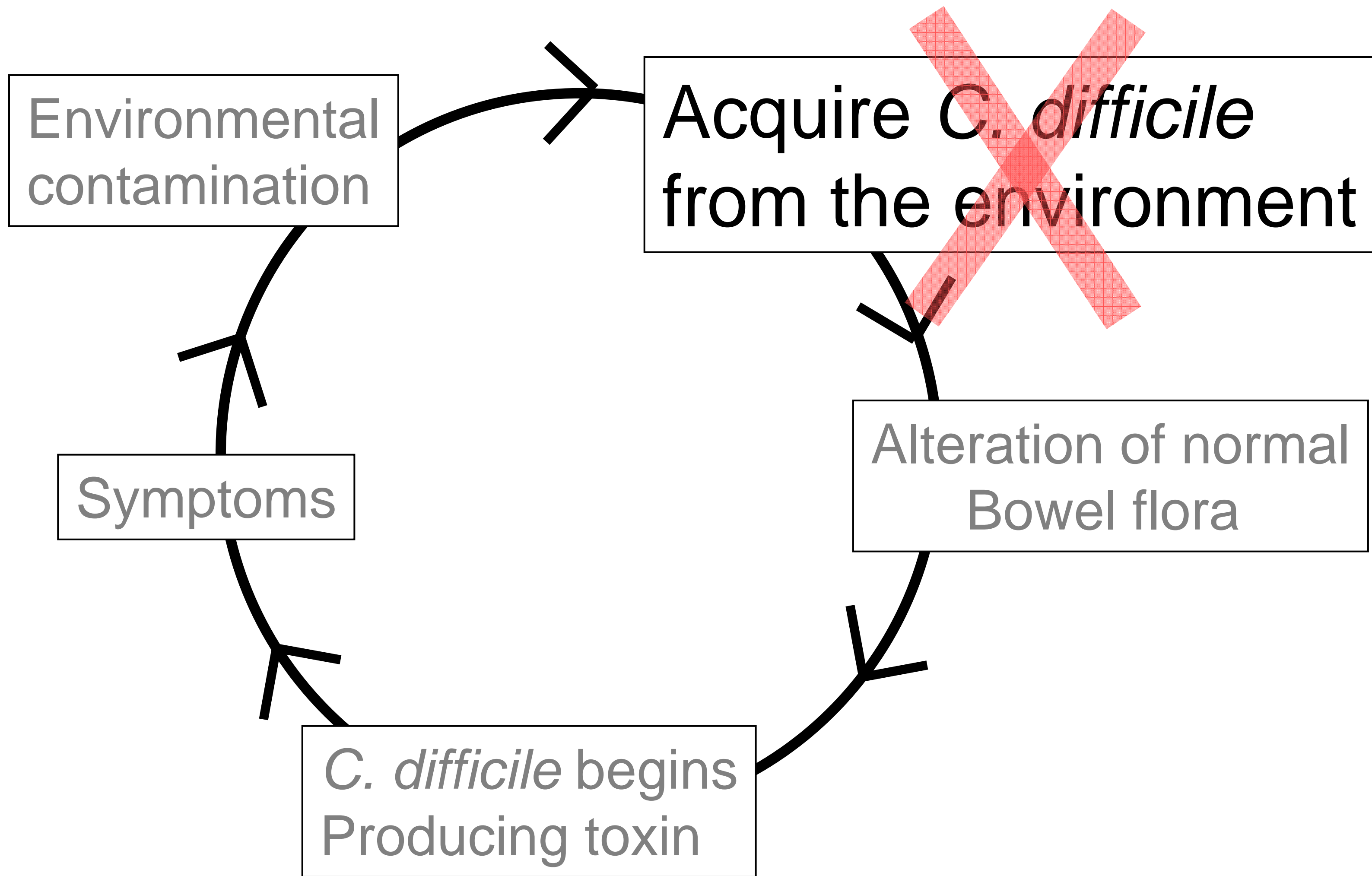
The CDAD cycle




Environmental contamination
Acquire *C. difficile* from the environment
Alteration of normal Bowel flora
C. difficile begins Producing toxin
Symptoms

Stopping Environmental contamination

- Isolate patients with diarrhea immediately
  - Single room and toilet (if possible)
  - Use gowns and gloves to care for patients
- Hand washing
- Early treatment
- Housekeeping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Stopping acquiring *C. difficile*

- Hand washing (patients, visitors and staff)
- Housekeeping
  - Frequent, well done cleaning
  - Use of disinfectants that can kill spores
  - Use of microfibre cloths that can pick up spores
- Cleaning of multiuse equipment

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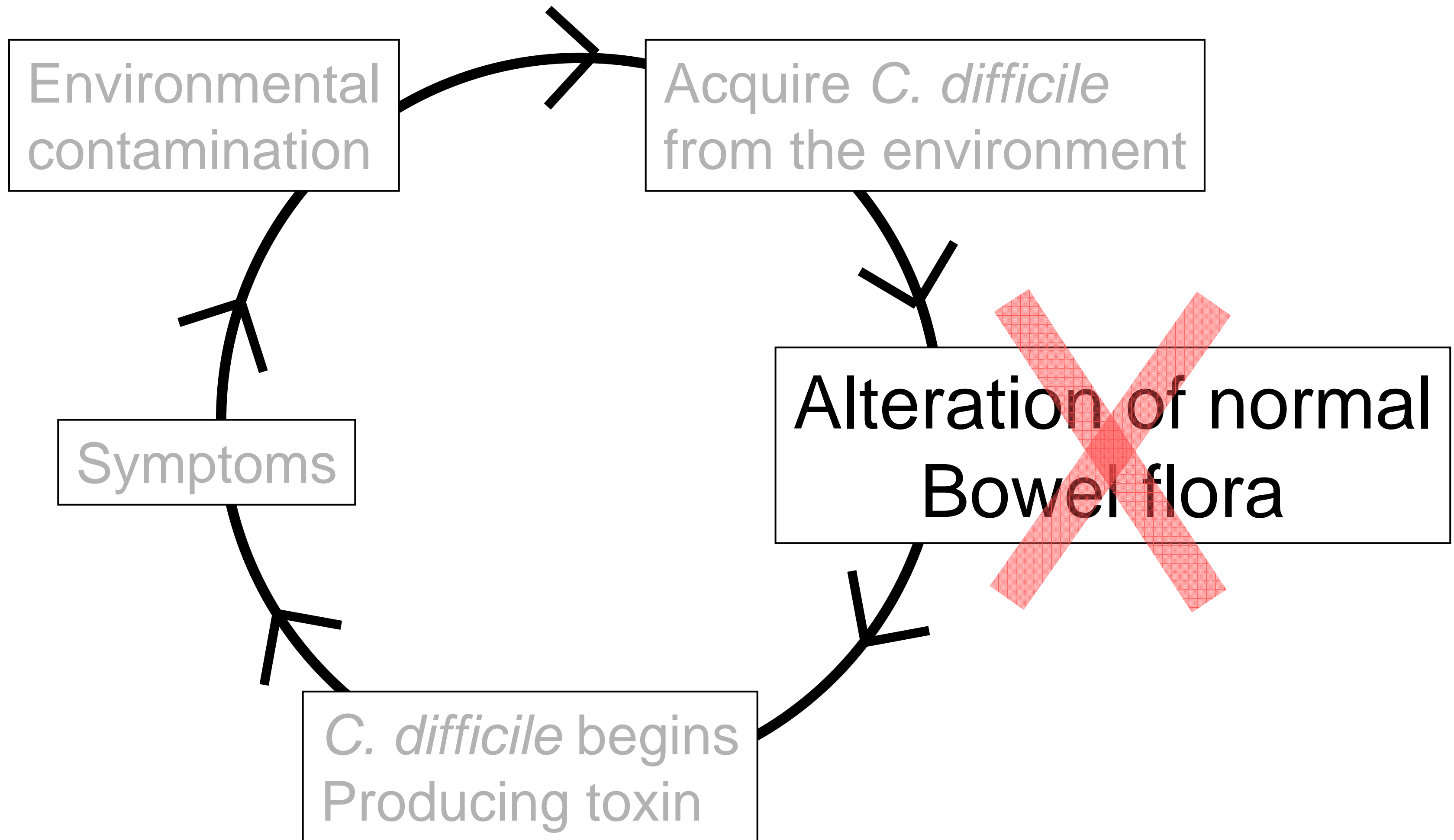
Alcohol *versus* soap and water

- Alcohol does not kill C. difficile spores but does kill the vegetative form of the bacteria
- Soap and water physically remove both forms
- Far better compliance with alcohol
- Glove use

The CDAD cycle



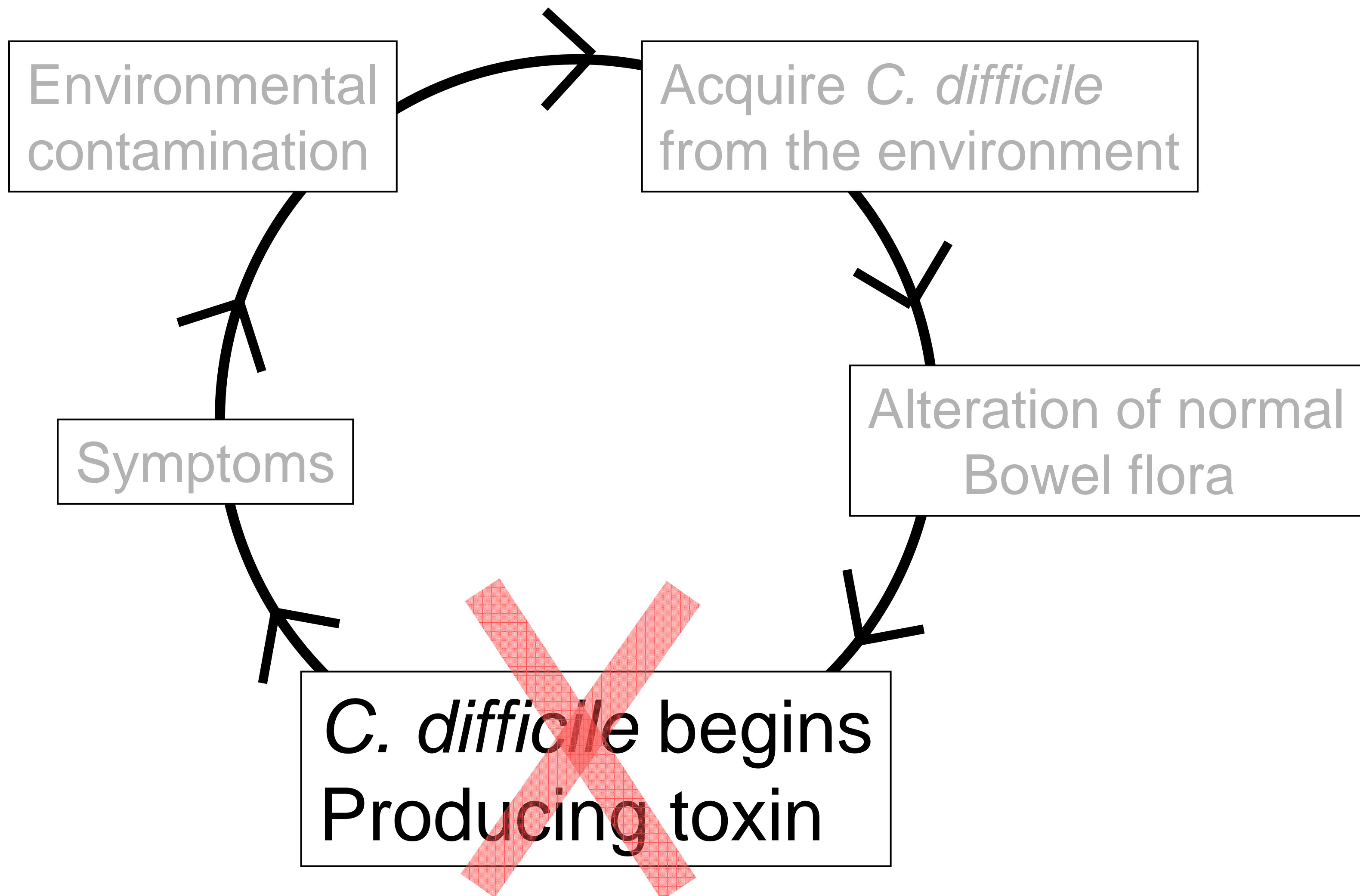
Stopping alteration of bowel flora

- Minimize antibiotic use
  - Needed at all?
  - Minimum duration
- Avoid certain antibiotics
  - Clindamycin
  - Cephalosporins (e.g. ceftriaxone)
  - Quinolones (e.g. moxifloxacin, levofloxacin)
- Probiotics?

Probiotics

- 2008 Cochrane review concluded there was insufficient evidence to recommend their use.

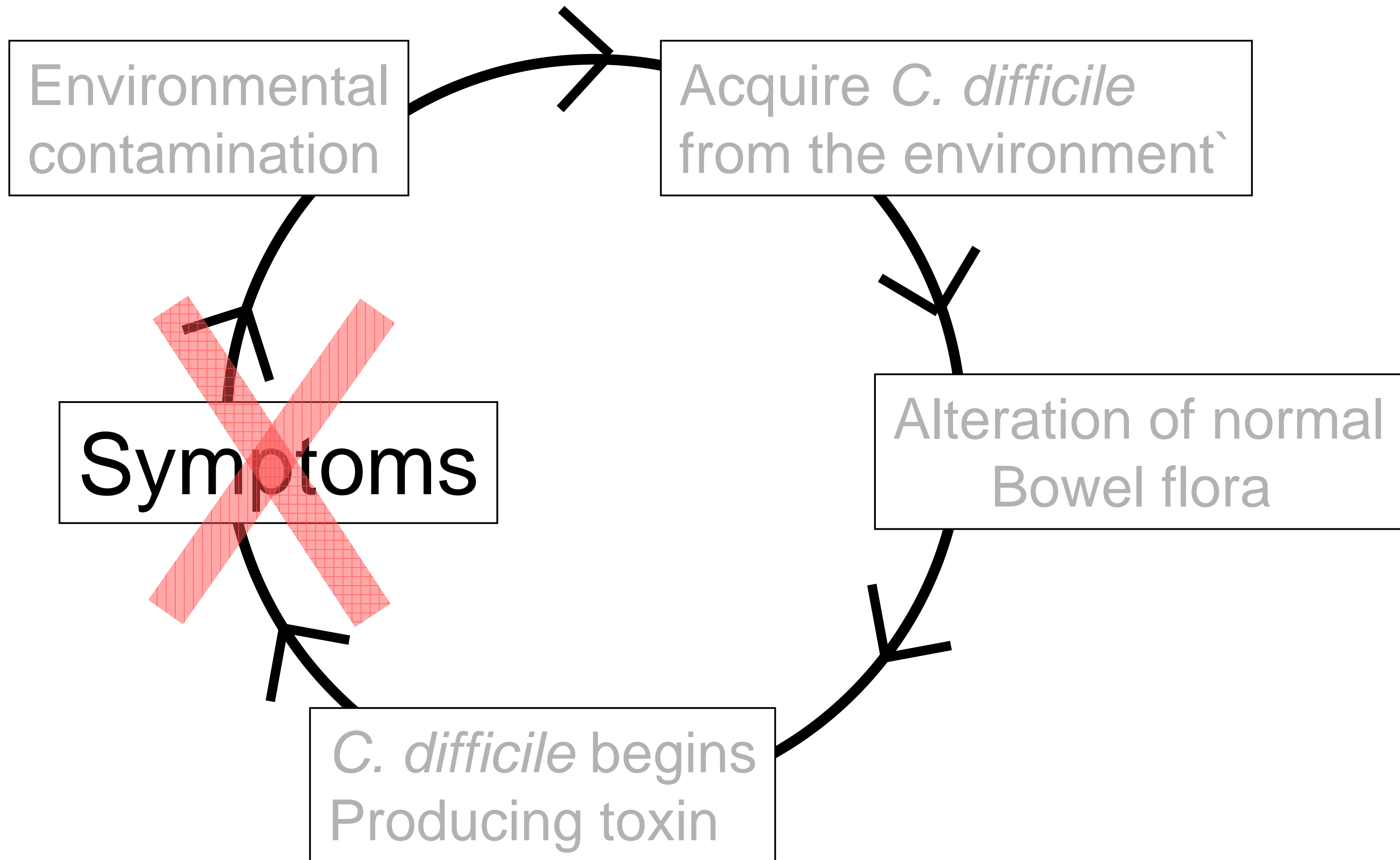
The CDAD cycle



Stopping toxin production

- Probiotics?
- Toxin-binding resins?

The CDAD cycle



Treating CDAD

- Stop causative antibiotics if possible
- Give other antibiotics that kill *C. difficile*
  - Metronidazole 500 q8h X 14d
  - Vancomycin 125 q6h X 14 days
    - Vancomycin taper
    - Retention enemas
- Removal of the colon
- Stool transplant
- frequent relapses (up to 25%)

The worsening story

- Emergence of a mutated *C. difficile* strain in Eastern US in late 1990s (NAP1)
- Toxin production is permanently turned on
  - Produces 16-23 times more toxin
  - Sicker patients, more relapses, more deaths
  - Often dramatic increase in hospital rates

The worsening story…

- NAP1 strain spread to Quebec early this decade
  - Multiple outbreaks,
  - Considerable media interest, inquests
- Spread to Europe at the same time
- More recently has spread throughout Canada

New Canadian epidemiology

- Increased:
  - Rates
  - Complications
  - Surgery
  - Deaths (roughly 20% of cases in Ontario outbreak hospitals)

Mortality reviews

- Started with Sault Ste. Marie
- Much confusion over whether these should be done, how they should be done
- Death certificates
- Ample opportunity for bias
- Extremely labour intensive

Ontario outbreaks

- All hospitals have had
  - Hospital-wide increases in rates
  - Problems with overcrowding
  - Difficulty defining the scope of the problem
    - Nobody to benchmark with
  - Challenges getting things under control
    - But all have eventually been very successful

Liability

- 2 class action law suits
- Did patients know they had CDAD?
  - Did they know how bad it was?

Looking forward

- Take CDAD seriously
- Work towards best practices
  - Early isolation, treatment, and retreatment of cases
  - Antibiotic controls
  - Enhanced housekeeping using sporicidal agents
  - Hand hygiene campaigns
  - New multiuse equipment

Questions?